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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/000,458	11/30/2001	Takehisa Yahiro	4641-61273	2299

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EXAMINER

EL SHAMMAA, MARY A

ART UNIT	PAPER NUMBER
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2881

DATE MAILED: 06/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/000,458

Applicant(s)

YAHIRO, TAKEHISA

Examiner

Mary A. El-Shammaa

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1,2,4-15 and 17-19 is/are rejected.
- 7) ☒ Claim(s) 3,16 and 20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Information Disclosure Statement

The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 4-6, 9, 11, 13-15, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's admitted prior art in view of Kawata (6,403,971).

Regarding claims 1, 11, 13, 14, and 18, the Applicant discloses in the specification and in Figs. 13-15 a charged-particle-beam microlithography method and device in which a reticle, defining a pattern to be transferred to a sensitive substrate, is irradiated with a charged-particle illumination beam, and a charged-particle patterned beam, formed by passage of the illumination beam through an illuminated portion of the reticle and carrying an aerial image of the illuminated

portion of the reticle, is projected onto a sensitive surface of a substrate to imprint the sensitive surface with the aerial image, a method and device for evaluating image performance, comprising defining a beam-transmitting measurement mark at an object plane; defining a knife-edged reference mark (102), at an image plane, as a corresponding through-hole in a charged-particle-scattering membrane (100); illuminating the measurement mark with a charged-particle beamlet (EB) propagating downstream of the measurement mark toward the reference mark (102); projecting the beamlet (EB) onto the reference mark (102) while scanning the beamlet (EB) over a knife-edge (101) of the reference mark (102) to produce non-scattered charged particles (e1) transmitted through the through-hole and forward-scattered charged particles (e2) transmitted through the membrane, the non-scattered and forward-scattered charged particles propagating downstream of the reference mark (102); and detecting the beam current of the charged particles with a detector (105) (See page 3, line 1 through page 4, line 20 of the Applicant's specification). In addition, the Applicant discloses a beam blur measurement means (106, 107, 108) being connected to the detector (105) and configured to measure beam blur from detection data obtained by the detector (See page 4, lines 2-20 of the Applicant's specification). The Applicant's disclosure of prior art does not disclose an illumination lens assembly and a projection lens assembly in addition to the disposal of a beam-limiting diaphragm situated downstream of a reference mark, the beam-limiting diaphragm comprising a diaphragm plate defining a beam-limiting aperture having a diameter sufficient to block most of the forward-scattered charged particles while not blocking the non-scattered charged particles from reaching the detector. Kawata discloses in Figs. 1-3 a microlithographic method and apparatus that includes an illumination lens assembly (13) and a projection lens assembly (21, 27) and

disposing a beam-limiting diaphragm (contrast aperture, **23**) downstream of a reference mark, the beam-limiting diaphragm comprising a diaphragm plate defining a beam-limiting aperture having a diameter sufficient to block most of the forward-scattered charged particles (**EB3**) while not blocking the non-scattered charged particles (**EB2**, **EB4**) from reaching the detector (Col. 1, Lines 7-15; Col. 2, Lines 58-62; Col. 4, Lines 20-28; Col. 5, Lines 45-51; Col. 6, Lines 1-24, 51-67; Col. 7, Lines 59-61). It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the beam limiting diaphragm of Kawata with the prior art disclosed by the Applicant because the inclusion of the diaphragm inhibits scattered particles from reaching the detector, which allows for easier axial alignment as well as increasing the signal-to-noise ratio (Col. 3, Lines 42-56).

Regarding claims 2 and 15, Kawata discloses projecting the beamlet using first and second projection lenses (**21**, **27**) (Col. 6, Lines 1-10, 47-57).

Regarding claims 4-6, Kawata discloses defining the measurement mark as a respective aperture in a subfield (**41**) of a reticle (**15**) (Col. 6, Lines 46-67; Col. 7, Lines 1-23).

Regarding claims 9 and 17, the Applicant discloses the prior art teaching that the through-hole in the charged-particle-scattering membrane is provided with a rectangular profile (See page 3, lines 6-12 of the Applicant's specification).

Claims 7, 8, 10, 12, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Kawata in further view of Kojima (6,441,384).

Regarding claims 7 and 8 the disclosed prior art and Kawata do not disclose the use of a dummy pattern. Kojima discloses defining a dummy pattern around the measurement mark in the reticle disposed at the object plane, illuminating the measurement mark and dummy pattern

with the charged particle beam, producing at least one dummy beam propagating downstream of the measurement mark, and detecting beam blur of the beamlet attributable to a space-charge effect resulting from the dummy beam (Col. 12, Lines 39-47). It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the use of a dummy pattern as taught by Kojima because Kojima teaches that the use of this dummy pattern helps optimize the resolution.

Regarding claims 10, 12, and 19 neither the disclosed prior art nor Kawata disclose the disposal of a second beam-limiting diaphragm downstream of the first beam limiting diaphragm, having the same features and functions of the first beam limiting diaphragm. Kojima discloses in Fig. 9 a first beam limiting diaphragm (**15**) and a second beam-limiting diaphragm (**2b**) downstream of the first beam-limiting diaphragm (**15**) (Col. 10, Lines 49-60; Col. 11, Lines 38-52; Col. 17, Lines 57-59). It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the second beam-limiting diaphragm of Kojima because Kojima teaches that the use of such diaphragms (apertures) greatly reduces blurring due to spherical aberrations (Col. 11, Lines 6-30).

Allowable Subject Matter

Claims 3, 16, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art fails to teach or fairly suggest, in addition to the features claimed in the independent

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claims, having an axial angle of the aperture being slightly greater than the convergence angle of the beamlet at the substrate, and specifically placing the beam-limiting diaphragm 2-20 mm downstream of the knife-edged reference mark.

Conclusion

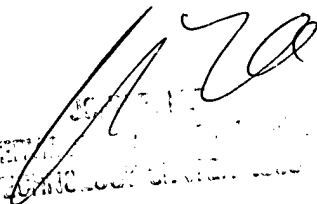
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. (6,538,255), (6,521,392), (6,352,799), (5,633,507).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary A. El-Shammaa whose telephone number is 703.308.0851. The examiner can normally be reached on M-F (8:30am-5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on 703.308.4116. The fax phone numbers for the organization where this application or proceeding is assigned are 703.872.9318 for regular communications and 703.872.9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.872.9317.

mae
May 23, 2003


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